	Attorney's Docket Number
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. § 371	046124-5121
	U.S. Application No. Unassigned **10/088631**

International Application. No.	International Filing Date	Priority Date Claimed
PCT/JP00/06441	September 20, 2000	September 21, 1999

Title of Invention:

INFORMATION PROCESSING METHOD AND INFORMATION PROCESSING SYSTEM

Applicants For EO/EO/US

(1) Teruo HIRUMA   (2) Tsutomu HARA   (3) Haruyoshi TOYODA   (4) Yasunori IGASAKI

Applicants herewith submit to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. § 371.
2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. § 371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. § 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. § 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☐ A copy of the International Application as filed (35 U.S.C. § 371(c)(2))
    a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
    b. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ **A copy of the International Application as filed has been transmitted by the International Bureau.**
7. ☒ A translation of the International Application into English (35 U.S.C. § 371(c)(2)).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. § 371(c)(3)).
    a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
    b. ☐ have been transmitted by the International Bureau.
    c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
    d. ☒ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. § 371(c)(3)).
10. ☒ An oath or declaration of the inventors (35 U.S.C. § 371(c)(4)).
11. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. § 371(c)(5)).

Items 12. to 15. below concern other document(s) or information included:
12. ☐ An Information Disclosure Statement under 37 C.F.R. § 1.97 and § 1.98.
13. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. § 3.28 and § 3.31 is included.
14. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

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15. ☒ Other items or information:
    a) International Search Report (Form PCT/ISA/210 (second sheet))
    b) Notification of Transmittal of Copies of Translation of the International Preliminary Examination Report (Form PCT/IB/338) and International Preliminary Examination Report (Form PCT/IPEA/409)
    c) Notice Informing the Applicant of the Communication of the International Application to the Designated Offices of PCT/JP00/06441 (Form PCT/IB/308)
    d) Notification Concerning Submission or Transmittal of Priority Document (Form PCT/IB/304)
    e) Cover Page of WIPO Publication WO 01/22190 (including English-language Abstract)

16. ☒   The following fees are submitted:
    Basic National Fee (37 C.F.R. § 1.492(a)(1)-(5)):
Search Report has been prepared by the EPO or JPO... ......$890.00
International preliminary examination fee paid to
  USPTO (37 C.F.R. § 1.482)...$710.00
No international preliminary examination fee paid to
  USPTO (37 C.F.R. § 1.482) but international search fee
  paid to USPTO (37 C.F.R. § 1.445(a)(2))..............................$740.00
Neither international preliminary examination fee
  (37 C.F.R. § 1.482) nor international search fee
  (37 C.F.R. § 1.445(a)(2)) paid to USPTO.........................$1,040.00
International preliminary examination fee paid to USPTO
  (37 C.F.R. § 1.482) and all claims satisfied provisions
  of PCT Article 33(2)-(4)... ......$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT = | $890.00

Surcharge of $130.00 for furnishing the oath or declaration later than
☐ 20 ☐ 30 months from the earliest claimed priority date
(37 C.F.R. § 1.492(e)). | $

Claims	Number Filed	Number Extra	Rate	
Total Claims	6 - 20 =	0	X $18.00	$
Independent Claims	2 - 3 =	0	X $84.00	$
Multiple dependent claim(s) (if applicable)			+ $280.00	$
			TOTAL OF ABOVE CALCULATIONS	$890.00
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. §§ 1.9, 1.27, 1.28)				-$
			SUBTOTAL =	$890.00
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. § 1.492(f)).				+$
			TOTAL NATIONAL FEE =	$890.00
Fee for recording the enclosed assignment (37 C.F.R. § 1.21(h)). The Assignment must be accompanied by an appropriate cover sheet (37 C.F.R. §§ 3.28, 3.31). $40.00 per property				$ 40.00
			TOTAL FEES ENCLOSED =	$930.00
			Amount to be refunded	$
			Amount to be charged	$930.00

  a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.
  b. ☒ Please charge my Deposit Account No. 50-0310 in the amount of **$930.00** to cover the above fees. A duplicate copy of this sheet is enclosed.

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c. ☒ **Except** for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and § 1.17 which may be required, or credit any overpayment to Deposit Account No. 50-0310.

Customer No. 009629

SEND ALL CORRESPONDENCE TO:

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1111 Pennsylvania Avenue, N.W.
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John G. Smith
Registration No. 33,818

Submitted: March 20, 2002

3

PATENT
ATTORNEY DOCKET NO.: 046124-5121

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
Teruo HIRUMA et al.	)	
	)	
Application No.: Unassigned	)	Group Art Unit: Unassigned
	)	
Filed: March 20, 2002	)	Examiner: Unassigned
	)	
For: INFORMATION PROCESSING	)	
METHOD AND INFORMATION	)	
PROCESSING SYSTEM	)	

Commissioner for Patents
Washington, D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Prior to examination on the merits, please amend the above-identified application as follows:

IN THE CLAIMS

Please amend claim 6 as follows:

6. (Amended) An information processing system according to claim 4, further comprising hologram image preparing means for forming said predetermined hologram image.

REMARKS

Applicants respectfully submit that no new matter has been introduced by this

Preliminary Amendment. Entry is therefore respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current

Preliminary Amendment. The attached page is captioned "**Version with markings to show**

changes made."

CONCLUSION

If there are any other fees due in connection with the filing of this Preliminary

Amendment, please charge the fees to our Deposit Account No. 50-0310. If a fee is required for

an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is

requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

MORGAN, LEWIS & BOCKIUS LLP

John G. Smith
Registration No. 33,818

Dated: March 20, 2002
CUSTOMER NO. 009629
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Washington, D.C. 20004
202-739-3000

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Claim 6 has been amended as follows:

6. (Amended) An information processing system according to claim 4 [or 5], further comprising hologram image preparing means for forming said predetermined hologram image.

VERIFICATION

The undersigned, of the below address, hereby certifies that he/she well knows both the English and Japanese languages, and that the attached is an accurate English translation of the PCT application filed on   September 20, 2000   under No. PCT/JP00/06441.

The undersigned declares further that all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this ____22nd____ day of ___February___, 2002.

Signature: _____

Name: Shiro TERASAKI

Address: c/o Soei Patent and Law Firm

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Tokyo 104-0061 Japan

DESCRIPTION

Information Processing Method and Information Processing System

Technical Field

The present invention relates to an information processing system which processes data of a data group comprising a plurality of information items in parallel; and, in particular, to an information processing method and information processing system which carry out data processing between group information items of data groups each including a number of information items.

Background Art

In the present age known as information-oriented society, various kinds of data are stored, and a variety of databases are constructed. Such databases are meaningless if they are simply stored. The added value and utility value of databases will increase if data groups constituting the stored database can freely be retrieved and subjected to information processing therebetween.

Conventionally, such data have been stored in memory devices of computers, and necessary information has been read out electrically and subjected to arithmetic processing, so as to carry out information processing.

Disclosure of the Invention

In the case where information processing is to be carried out between data groups each comprising a number

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of data items when processing information of such a database, arithmetic operations are necessary between individual data items constituting a data group or in the whole data group. It has been common for conventional electronic information processing apparatus to carry out these arithmetic operations as occasion arises, or a number of arithmetic processing circuits are provided so as to carry out the arithmetic operations in parallel.

In the former case, even when a high-speed arithmetic processing circuit is utilized, the arithmetic processing time dramatically increases if the number of processing data items becomes enormous, which makes it difficult to raise the information processing speed. On the other hand, the latter case is problematic in that the number of circuits becomes enormous, thereby raising the cost of the apparatus. Also, it is inefficient when the number of data items constituting the data groups is small.

Therefore, in view of the problems mentioned above, it is an object of the present invention to provide an information processing method and information processing system which can efficiently carry out information processing between data groups each having a number of data items at a high speed.

For overcoming the above-mentioned problems, the information processing method in accordance with the present invention comprises the step of carrying out parallel

information processing between a plurality of information groups each comprising a plurality of information items; wherein a plurality of data items constituting data group information are arranged three-dimensionally; and wherein

5 a data correlation calculation between a plurality of thus arranged information groups is carried out by utilizing an arrangement characteristic.

On the other hand, the information processing system in accordance with the present invention is an information

10 processing system for processing information between a plurality of information groups each comprising a plurality of information items in parallel; the system comprising arranging means for three-dimensionally arranging a plurality of data items constituting data group information

15 into a predetermined form, and arithmetic means for carrying out a data correlation calculation between a plurality of information groups arranged by the arranging means.

According to the present invention, a data group comprising a number of data items is expressed as a

20 predetermined virtual three-dimensional image. The data correlation calculation can be carried out easily at a high speed by utilizing a characteristic of the three-dimensional image.

Preferably, each data group information is arranged

25 as a hologram image, and an image correlation calculation is carried out between hologram images. As a consequence,

an information group comprising a plurality of information items is expressed as a single hologram image. When a data correlation calculation is performed between the holograph images, the arithmetic operation between information groups having a large amount of data can be carried out efficiently at a high speed. The hologram image may be either projected as an optical hologram image or held in a memory within a computer.

Preferably, the arithmetic means projects a hologram image representing each data group, and optically carries out an image correlation calculation.

Carrying out an optical image correlation calculation makes it unnecessary to construct arithmetic devices by a number corresponding to the number of pixels as in an electronic parallel arithmetic processing system, whereby information of data groups including a number of information items can be processed effectively with a small amount of resources without requiring enormous hardware and software resources even when the amount of data is very large.

Preferably, hologram image preparing means for forming a predetermined hologram image is further provided. This is favorable in that information processing of data groups becomes easier.

Brief Description of the Drawings

Fig. 1 is a diagram showing a first embodiment of the information processing system in accordance with the present

invention as a whole;

Fig. 2 is a view for explaining a hologram image representing a data group used in the apparatus of Fig. 1;

Figs. 3 and 4 are views for explaining the recording and reproducing of the hologram image of Fig. 2; and

Fig. 5 is a diagram showing a second embodiment of the information processing system in accordance with the present invention as a whole.

Best Modes for Carrying Out the Invention

In the following, preferred embodiments of the present invention will be explained in detail with reference to the accompanying drawings. To facilitate the comprehension of the explanation, the same reference numerals denote the same parts, where possible, throughout the drawings, and a repeated explanation will be omitted.

Fig. 1 is a schematic diagram of the information processing system in accordance with the present invention. This system is one which projects hologram images 7a, 7b, each representing a data group, and optically carries out a correlation calculation between the two images; and is configured as will be explained in the following.

This system is roughly divided into a projection system for projecting hologram images, and an arithmetic processing system for carrying out an image correlation calculation between the projected hologram images.

First, the projection system has hologram devices 6a,

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6b in which the hologram images 7a, 7b are recorded. The hologram devices 6a, 6b are configured such that laser beams split by a splitter 20 and a mirror 21 after being emitted from a laser light source 1 are made incident thereon, whereas acoustooptical cells 5a, 5b, each made of a single crystal of tellurium dioxide, for example, are arranged on the respective incident optical paths of the laser light beams. Connected to the respective acoustooptical cells 5a, 5b are voltage-controlled oscillators (VCOs) 4a, 4b for generating a high-frequency voltage for controlling their operations, whereas control voltage generating circuits 3a, 3b are connected to the VCOs 4a, 4b, respectively.

The arithmetic processing system has a Fourier transform lens 8 into which the hologram images 7a, 7b are introduced, and a spatial light modulator (SLM) 9 of optical address type having a writing light entrance surface arranged at a focal position of the lens 8, whereas a half mirror 10 is disposed on the reading light entrance surface side of the SLM 9, whereby the reading light emitted from a laser light source 12 is guided to the reading light entrance surface of the SLM 9 by way of a mirror 11 and the half mirror 10. A Fourier transform lens 13 is arranged on an extension of the path from the SLM 9 to the half mirror 10, whereas a photodetector 14 is disposed at a focal position of the lens 13.

A hologram image used in this system will now be

explained. Fig. 2 is a perspective view of the hologram image 7a (the same as 7b). For simplification, the case where a data group composed of $3 \times 3 \times 3 = 27$ items of data is turned into a hologram image will be explained here by way of example.

As shown in Fig. 2, each data group is represented by arranging lattice points by $3 \times 3 \times 3$ on a space, assigning data items to the lattice points one by one, and displaying standardized data values as brightness, concentration, and phase (refractive index difference). In the following, three planes each formed by nine lattice points will be referred to as planes A, B, and C in succession from the left side of the drawing.

The recording and reproducing of the hologram images with respect to the hologram devices 6a, 6b will be explained with reference to Figs. 3 and 4. First, for recording a hologram image, an image of a predetermined plane, such as plane A, in a hologram image to be recorded, is displayed on an SLM 30, and thus displayed image is read out with a laser beam, so as to irradiate the hologram device 6a. On the other hand, the crystal plane is irradiated with another laser beam acting as reference light by an angle of θ_1, whereby an image of the projected plane A is recorded within the crystal. While the SLM 30 is moved in the direction of optical axis of reading laser beam, the displaying image is successively switched to images of planes B and C, whereby a predetermined hologram can be recorded within the hologram

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device 6a. Further, with the angle of reference light being changed to θ_2, similar recording may be carried out, whereby another hologram image can be recorded. In the case of 1 cm^3 of a single crystal of lithium niobate, about 5000 planar

5   images can be recorded.

When reproducing the recorded information, reproducing light is made incident on the crystal at the angle of θ_1. As a consequence, the hologram image written with the reference light at the angle of θ_1 is read out and

10   projected.

Explanations will now be provided for operations of this system as a whole, i.e., the information processing method in accordance with the present invention. First, a number of data items are standardized, each data item is

15   expressed by brightness, luminance, and the like, and hologram devices 6a, 6b each arranging the data items spatially, i.e., three-dimensionally, so as to record them as a hologram image are prepared. Recorded in the hologram devices 6a, 6b are respective hologram images 7a, 7b

20   representing data groups different from each other.

Laser light emitted from the light source 1 is split into two by the beam splitter 20, one of thus obtained two laser beams is directly introduced to the acoustooptical cell 5b, whereas the other is reflected by the mirror 21

25   so as to be guided to the acoustooptical cell 5a. To the respective transducers of the acoustooptical cells 5a, 5b,

high-frequency voltages are applied from their corresponding VCOs 4a, 4b. The frequencies of the high-frequency voltages can be changed by adjusting the control voltages applied to the VCOs 4a, 4b from the control voltage generating circuits 3a, 3b. Within the acoustooptical cells 5a, 5b, ultrasonic waves are propagated by the high-frequency voltages applied to their transducers, and thus propagating ultrasonic waves function as gratings for the incident laser light, whereby light is diffracted by angles corresponding to the spatial frequencies of the gratings. When the hologram devices 6a, 6b are thus irradiated with laser light having a predetermined angle as reading light, predetermined hologram images 7a, 7b are projected.

The read-out hologram images 7a, 7b are optically subjected to joint Fourier transform by the Fourier transform lens 8, whereby a joint Fourier transform image is formed on the writing surface of the SLM 9. The laser beam is made incident on the reading light entrance surface of the SLM 9 from the laser light source 12 by way of the mirror 11 and half mirror 10, so as to read out this image. Thus read-out image is subjected to Fourier transform again by the Fourier transform lens 13, whereby a correlation value between the object image and a reference image can be obtained by the photodetector 14. At that time, results of arithmetic operations between predetermined planes of the hologram images 7a, 7b are obtained when the photodetector 14 is moved

in the optical axis direction.

The high-frequency voltages applied to the acoustooptical cells 5a, 5b can have a frequency of 100 MHz or higher. In this case, about 1000 images can sequentially be read out per second from the hologram devices 6a, 6b. When an SLM having a response speed of 1 millisecond is used as the SLM 9 for arithmetic operations, a correlation calculation can be carried out by a unit of milliseconds between hologram images each having $1000 \times 1000 \times 1000$ pixels with each pixel being displayed by an 8-bit (256-gradation) grayscale.

Fig. 5 is a schematic diagram showing a second embodiment of the information processing system in accordance with the present invention. This apparatus has a configuration different from that of the first embodiment shown in Fig. 1 in the projection system for hologram images. In this apparatus, hologram images are determined by a computer 43 from calculations according to each data item of data groups, thus determined images are stored in their corresponding memories 42a, 42b, and thus stored images are displayed in spatial light modulators 41a, 41b of electric address type, whereby the hologram images are projected.

This system can carry out a correlation calculation between images at a high speed as with the first embodiment. The correlation calculation may also be carried out between interference fringe images, on which the hologram images

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are based, instead of the hologram images. The accuracy in arithmetic operation is expected to improve in this case since the images for carrying out the correlation calculation are compressed into two-dimensional images.

Though the foregoing explanation relates to an example carrying out an optical correlation calculation, calculations may be carried out electronically with data being arranged on a memory of a computer. In this case, with computer holograms being generated by calculations, an arithmetic operation (e.g., correlation calculation) may be carried out between their images, so as to reduce the amount of arithmetic operations, thereby making it possible to perform high-speed arithmetic operations.

The data groups may be arranged on a surface of a virtual three-dimensional body having a predetermined characteristic or therewithin. When a correlation calculation between three-dimensional bodies is carried out by utilizing a characteristic of a virtual three-dimensional body, the amount of arithmetic operations can similarly be reduced, whereby high-speed arithmetic operations can be carried out.

Industrial Applicability

The present invention is widely applicable to apparatus and methods which analyze various kinds of data such as statistical data and financial data in a multifaceted fashion.

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CLAIMS

1.   An information processing method comprising the step of carrying out parallel information processing between a plurality of information groups each comprising a plurality of information items;

wherein a plurality of data items constituting data group information are arranged three-dimensionally; and

wherein a data correlation calculation between a plurality of thus arranged information groups is carried out by utilizing an arrangement characteristic.

2.   An information processing method according to claim 1, wherein said data group information is arranged as a hologram image; and wherein an image correlation calculation is carried out between hologram images.

3.   An information processing system for processing information between a plurality of information groups each comprising a plurality of information items in parallel,

said system comprising:

arranging means for three-dimensionally arranging a plurality of data items constituting data group information into a predetermined form; and

arithmetic means for carrying out a data correlation calculation between a plurality of information groups arranged by said arranging means.

4.   An information processing system according to claim 3, wherein said arranging means arranges said data

items as a predetermined hologram image; and wherein said arithmetic means carries out an image correlation calculation between a plurality of hologram images so as to perform said data correlation calculation.

5   5.   An information processing system according to claim 4, wherein said arithmetic means projects a hologram image representing each data group and optically carries out said image correlation calculation.

         6.   An information processing system according to claim 4 or 5, further comprising hologram image preparing
10 means for forming said predetermined hologram image.

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ABSTRACT

Predetermined hologram images 7a, 7b formed by three-dimensionally arranging a plurality of data items constituting data group information are read out from hologram devices 6a, 6b, and an image correlation calculation between the hologram images 7a, 7b is carried out by a Fourier transform optical system constituted by Fourier transform lenses 8, 13 and an optical address type SLM 9, whereby a correlation value of data groups is detected by a photodetector 14.
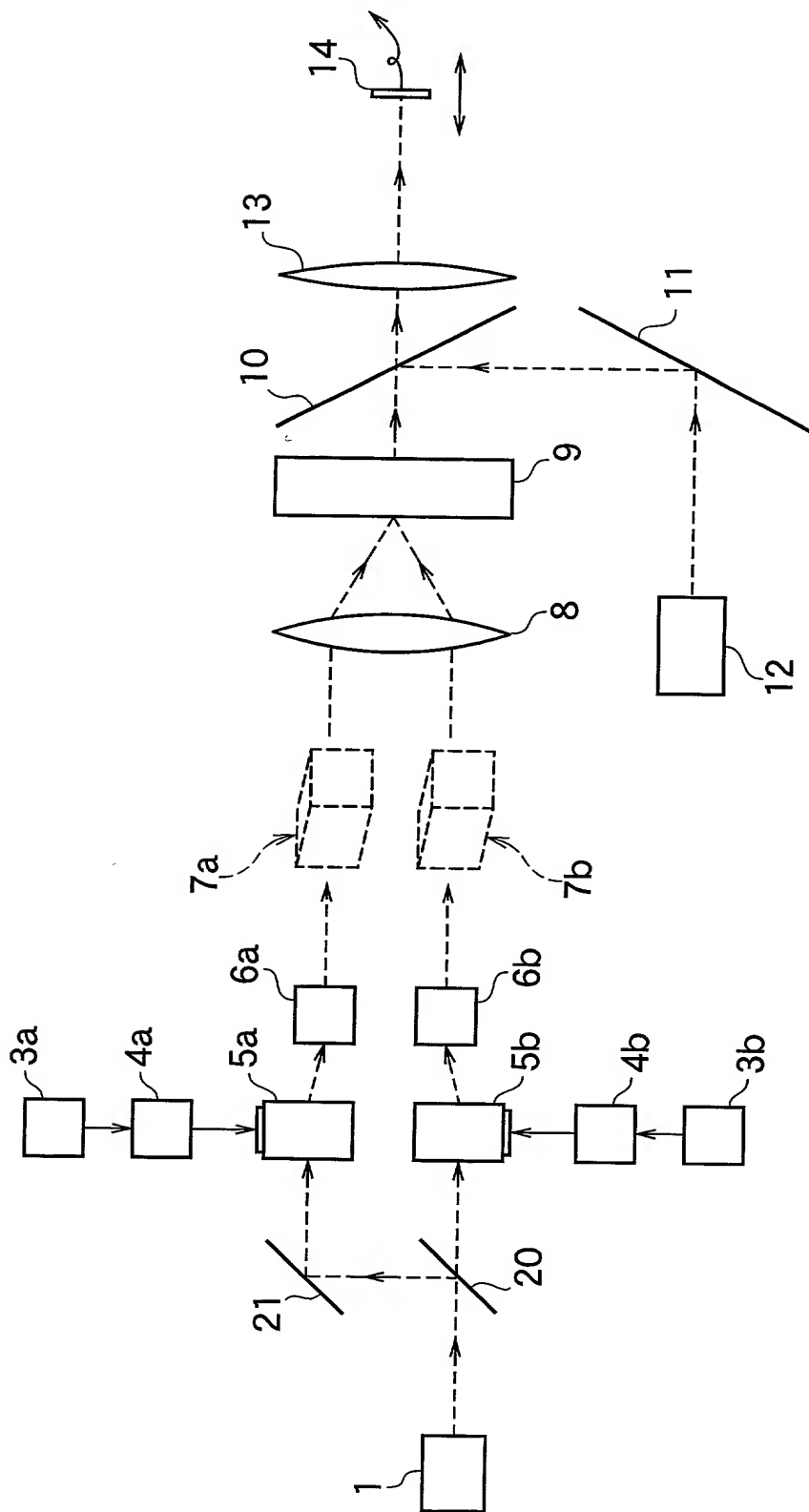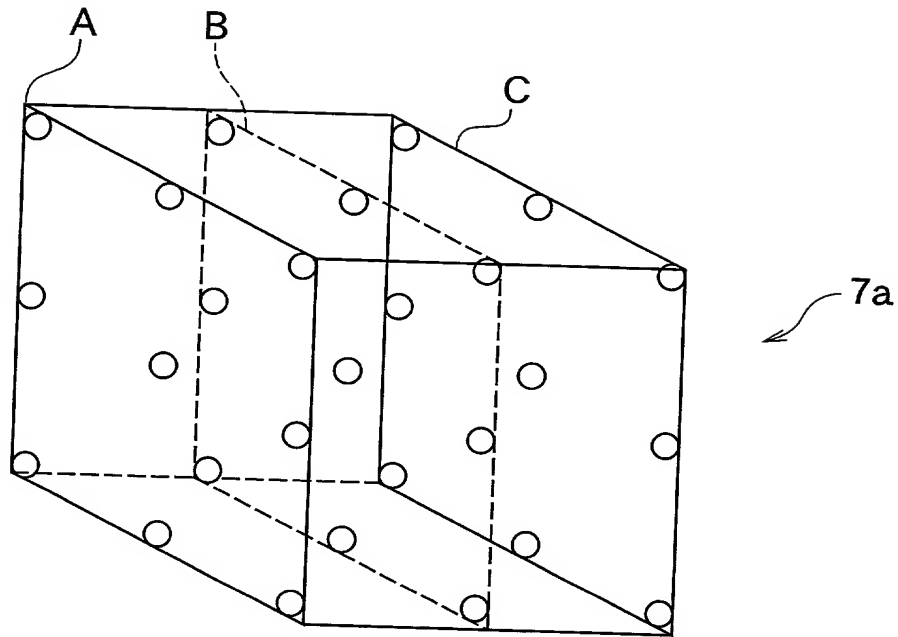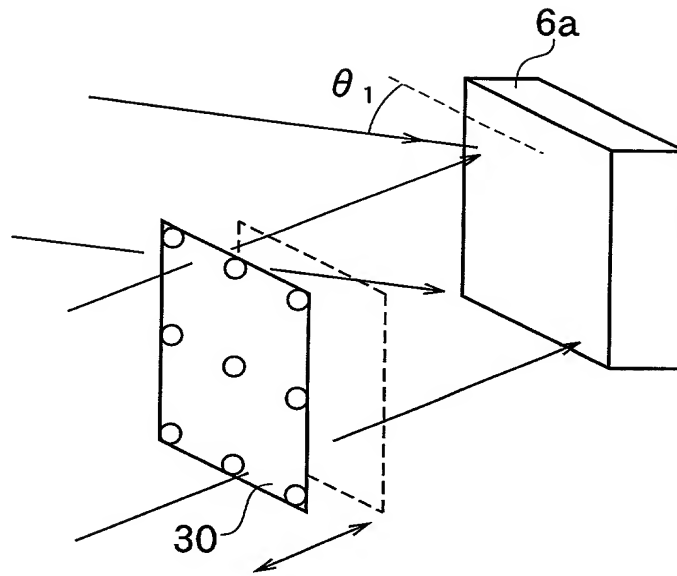
5

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14

FP00-0164-00

Fig.1

FP00-0164-00

Fig.2

Fig.3

Fig.4

Fig.5

Attorney's Docket No. _____
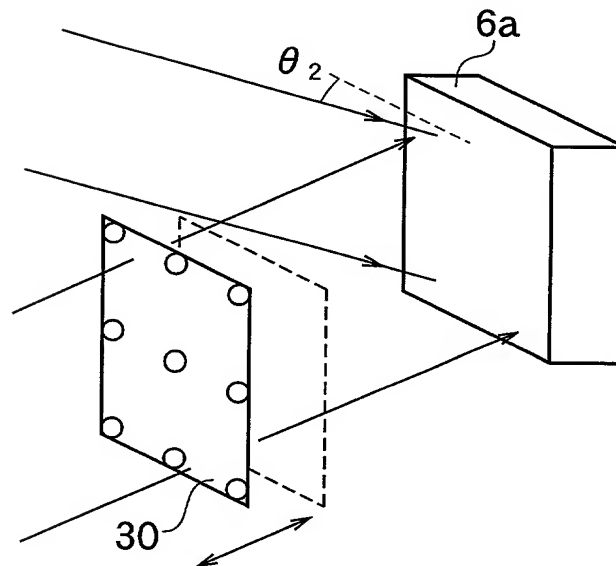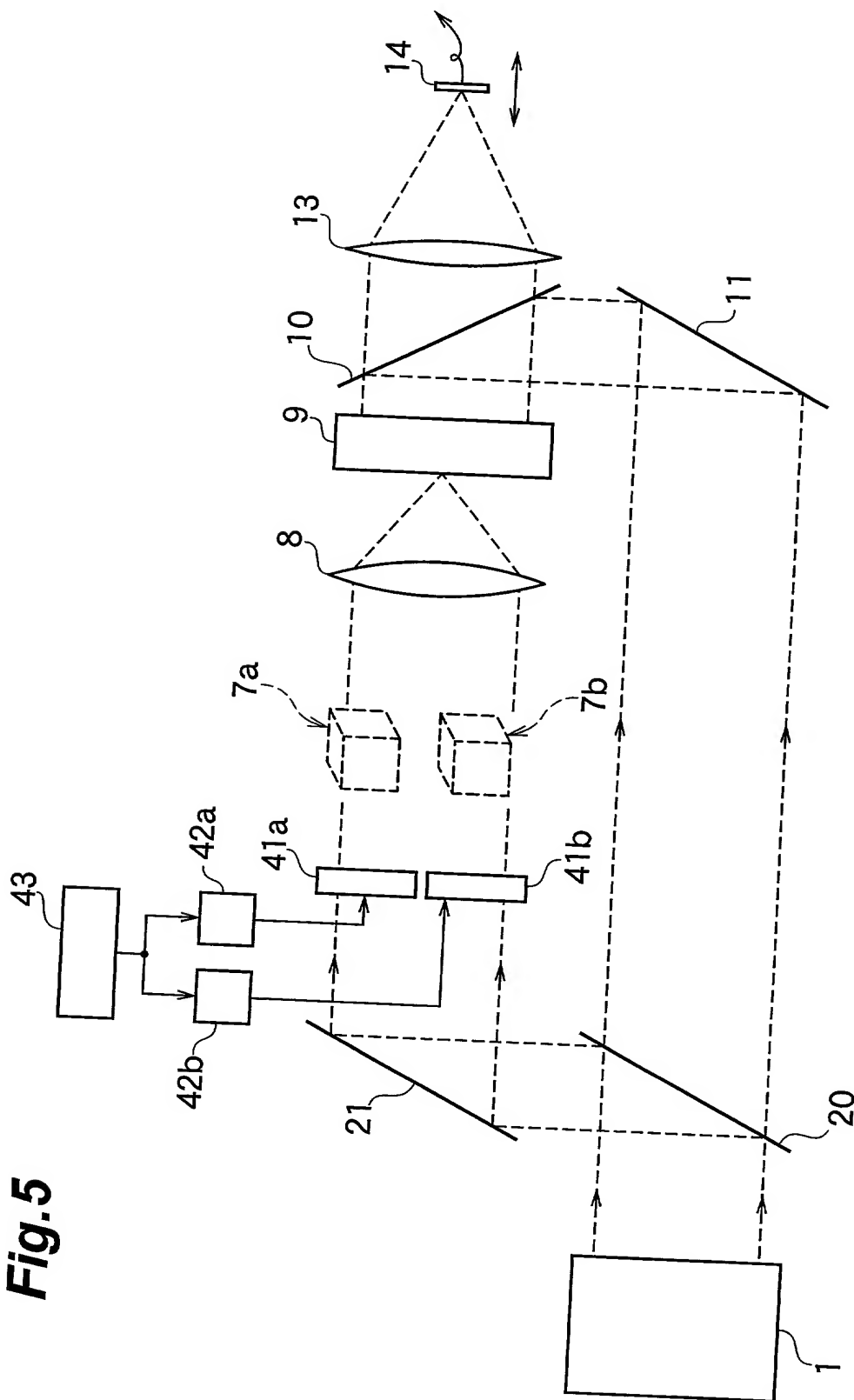
Combined Declaration and Power of Attorney

As a below named inventor, I hereby declare that:

This declaration is of the following type:

[ ] original   [ ] supplemental

[X] national stage of PCT
[ ] divisional   [ ] continuation   [ ] continuation-in-part

My residence, post office address and citizenship are as stated next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

[ ]   is attached hereto.

[ ]   was filed on _____
            as United States Application Serial Number _____ and,
            was amended on _____ (if applicable).

[X]   was filed on _____September 20, 2000_____
            as PCT International Application Number ___PCT/JP00/06441___ and,
            was amended under PCT Article 19 on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority under Title 35, United States Code, Section 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATIONS, BENEFIT CLAIMED UNDER 35 USC §119(a)

Application Number	Country	Date of Filing (Day/Month/Year)	Priority Claimed Under 35 USC 119	
P1999-162600	Japan	09 / June / 1999	[ ] Yes	[X] No
P1999-267070	Japan	21 / September / 1999	[X] Yes	[ ] No
			[ ] Yes	[ ] No

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

PRIOR U.S. PROVISIONAL APPLICATIONS, BENEFIT CLAIMED UNDER 35 USC §119(e)

(Application No.)	(Filing Date)	(Application No.)	(Filing Date)
(Application No.)	(Filing Date)	(Application No.)	(Filing Date)

I hereby claim the benefit of Title 35, United States Code Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS
DESIGNATING THE U.S., BENEFIT CLAIMED UNDER 35 USC §120

(Application No.)	(Filing Date)	(Status: Patented, Pending, Abandoned)
(Application No.)	(Filing Date)	(Status: Patented, Pending, Abandoned)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the registered practitioners of MORGAN, LEWIS & BOCKIUS LLP included in the Customer Number provided below to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

Customer Number 009629

Send Correspondence to: Customer Number 009629
MORGAN, LEWIS & BOCKIUS LLP

1111 Pennsylvania avenue, NW
WASHINGTON D.C., 20004

Direct Telephone Calls to: John G. Smith at telephone number 202-739-3000

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full Name of sole or first inventor	
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Inventor's signature	Date
	February 22, 2002
Residence	
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Citizenship	
Japan	
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Full Name second joint inventor, if any	
Tsutomu HARA	
Second inventor's signature	Date
	February 22, 2002
Residence	
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Citizenship	
Japan	
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